

## INTRODUCTORY COMMENTS

- There are growing concerns about occurrence of organic wastewater compounds (OWCs) in U.S. streams and human drinking water
- The occurrence of very small concentrations of pharmaceutical compounds in drinking water sources receives a lot of attention
- However, many researchers believe that long-term effects of municipal and industrial wastewater discharges to stream environments pose a very substantial risk to the environment
- Currently, there are many unregulated compounds (that is, they have no aquatic-life criteria established by EPA) that are known to have endocrine disrupting or toxic effects on aquatic organisms
- EPA is struggling to keep up with the large amount of research being conducted that indicates adverse environmental effects from unregulated OWCs
- In 2006, EPA issued an Aquatic-Life Criteria for nonylphenol, a surfactant derived from many commonly used household and industrial detergent products, but there are many other compounds of concern
- With the large body of research that is being developed on effects of OWCs in aquatic environments, we believe it is prudent that Montana undertakes activities to assess the occurrence of OWCs in the States waters; this proposal is a starting point for those activities
- The proposed study would document the occurrence of 115 different OWCs in streams receiving discharges from wastewater treatment plants
- The proposed work is not intended to be a witch hunt or to specifically identify treatment plants that are discharging large concentrations of OWCs
- The intent is to determine whether there are legitimate concerns about OWCs in Montana streams and, if concerns become apparent, to aid in directing resources to address them

## **BULLETS ON COMPOUND CLASSES**

- The USGS analytical schedules include compounds in the following classes:
  - Pharmaceuticals
  - Antibiotics
  - Plant and animal sterols (including both natural and synthetic hormones)
  - Detergents
  - Plasticizers
  - Fragrances
  - Fire retardants
  - Solvents
  - Polyaromatic hydrocarbons
- All of these classes include individual compounds suspected or known to have various adverse impacts on aquatic organisms

## **BULLETS ON USGS ANALYTICAL LABS**

- USGS researchers have spearheaded development of analytical methods to determine concentrations of OWCs in natural streams in the US
- Finding reputable laboratories that use published and verifiable methods for analyzing OWCs is very difficult
- High-quality data are very important in dealing with a topic as important and sensitive as the occurrence of OWCs in the environment

## **BULLETS ON ENDOCRINE-DISRUPTING COMPOUNDS**

- Endocrine disrupting compounds are receiving a lot of attention
- These compounds interfere with the natural reproductive, growth, or metabolic processes of organisms by either mimicking natural hormones or by suppressing the activity of natural hormones
- A commonly cited example of endocrine disruption in aquatic organisms is adverse impacts on sexual characteristics of fish populations downstream from discharges from wastewater treatment plants
- Boulder Creek, Colorado – 83% of white suckers downstream from the discharges from the Boulder wastewater treatment plant were female; detectable concentrations of estrogen and ethynyl estradiol (synthetic) in Boulder Creek below the treatment plant.
- England – Roach (a European fish) sex ratios were strongly skewed toward female downstream from wastewater discharges with large concentrations of nonylphenol and octylphenol
- Reproductive hormones (such as estrogen) are the most potent endocrine disrupting compounds, with activity levels in the several parts per trillion range – essentially any detection of a reproductive hormone in a natural stream is a potential cause for concern
- Anthropogenic OWCs, especially including some plasticizers, surfactants, and fragrances have been shown to have endocrine-disrupting effects, with activity levels ranging from about 10 to over 100 parts per billion – although their activity levels are higher, several of these compounds are very common in municipal and industrial wastewater discharges and sometimes exceed the activity levels